DEBT COMPOSITION AND LAX SCREENING IN THE ISRAEL CORPORATE BOND MARKET

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Abstract

Corporate bond markets may suffer from investors' lack of competence in screening out low-quality issuers. We use data from the Israeli capital market in 1999-2009 to investigate the quality of corporate bond issuers and the role of the institutional investors in the screening process in the corporate bond market. The findings suggest that higher quality firms were more likely to issue bonds, but firms of lower quality tended to raise a higher fraction of their debt through bond issuance. Firms with higher proportion of their debt in bonds out had also a higher tendency to default. Institutional investors intensively funded firms with higher share of bonds in their long-term debt despite their lower quality, and therefore were partially responsible for the lax screening in the corporate bond market.

Keywords: Corporate Bonds, Debt Composition, Credit Rating, Emerging market, Institutional Investors

JEL classifications: *G23, G24, G32*

1. Introduction

Previous studies proposed theories to explain a firm's choice between public debt financing and private debt financing. Fama (1985) argued that public debt financing requires producing public information, which is costlier than the information required by private creditors. Therefore, only large firms tend to issue public debt. Diamond (1989), Diamond (1991), Besanko and Kantas (1993), and Holmstrom and Tirole (1997) described the role of financial intermediates in reducing ex-ante incentive problems. Firms with major incentive problems may use intermediaries for their screening and monitoring services. This service is costly, so firms with minor incentive problems avoid it by raising debt directly from the public.

An additional advantage of private debt financing is the efficiency of liquidation and reorganization in the event of financial distress (Chemmanur and Fulghieri, 1994; Gertner and Scharfstein, 1991, Bolton and Freixas, 2000). Renegotiation with public debt-holders is much more complicated due to major conflicts of interest between debt-holders that may ultimately lead to a value-destructing liquidation process. Firms with a higher probability of financial distress (higher credit risk) may burden intermediaries with the higher cost of raising debt in order to avoid inefficient liquidation. Firms facing lower financial distress probabilities, on the other hand, find the benefits of renegotiating private debts less attractive and therefore tend to rely more on public debt.

Overall, the aforementioned theories predict a higher tendency toward long-term debt-raising by larger and less risky firms. Databases classifying debt as publicly traded or privately held are almost nonexistent, and therefore only a limited number of papers have examined these theories empirically. Empirical research on public firms in the US confirmed the relationship between debt composition and credit quality. Cantillo and Wright (2000) showed that large, profitable companies with collateral do indeed raise debt directly from the public. Their results supported the hypothesis that intermediaries have better reorganization skills but also higher opportunity cost for capital than bondholders have. Denis and Mihov (2003) examined the choice between bank debt, non-bank private debt and public debt, and discovered that firms with the highest credit quality borrow from public sources, firms with medium credit quality borrow from banks, and firms with the lowest credit quality borrow from non-bank private lenders. Johnson (1997) discovered systematic use of bank debt among firms with access to the public debt market, suggesting that the benefits attributed to bank

debt remain important even after firms cross the quality threshold that allows them access to the public debt market. Nevertheless, the greater the credit quality of a firm, the more it relies on public debt rather than on private debt.

Theoretical papers predicting the absence of low-quality firms in the corporate bond market assumed that market players are able to assess credit quality and incentive problems of potential debtors (Fama, 1985; Rajan, 1992). We conjecture that this is not the case in underdeveloped capital markets. We use data from the Israeli capital market to investigate the quality of corporate bond issuers and the role of the financial institutions in the screening process on the corporate bond market.

The Israeli capital market underwent several major changes during the period 2003-2009. Rising taxes and privatization revenues together with the government's policy of public debt reduction led to a decrease in the issuance of government bonds. While the annual net governmental bond issuance in 2001-2004 averaged 1.1 percent of the GDP, it dropped to -1.6 percent in 2005-2007. As a consequence, the demand for fixed-income securities translated into tremendous growth in corporate bond issuance. The corporate bond market, which was almost nonexistent prior to 2004, grew more than tenfold within a few years.[1] This new corporate bond market offered competition to the centralized banking system and hence was mostly perceived as a positive evolution. Critics, however, claim that many firms exploited Israeli institutional investors' lack of experience with this type of instrument to raise funds too cheaply.

The purpose of this paper is to examine the attributes of bond issuers during this period and investigate whether market conditions were indeed exploited by risky firms. This study is consistent with Harford, Martos-Vila and Rhodes-Kroft (2015) who showed that firms take advantage of the rating inaccuracies on the US corporate bond market. In a broader perspective, this study also aligns with papers documenting the effect of stock valuation on capital structure: Welch (2004), Dong, Hirshleifer and Teoh (2012) and Khan, Kogan and Serafeim (2012) and others.

We have solid ground to believe that the Israeli corporate bond market suffered from lax screening. The Hodak Committee, a think-tank committee established by the

[1] According to the Bank of Israel's 2010 annual report, the market value of the corporate bond market grew from approximately USD 6 billion in 2003 to USD 73 billion in 2009.

Israel Ministry of Finance in 2009 to evaluate the activity of institutional investors in the Israeli credit market, pointed out severe problems in the functioning of institutional investors. The committee concluded that institutional investors, who are supposed to be the gatekeepers of the corporate bond market, lacked the competence or the willingness to fulfill this role. The committee discovered that absent credit risk analysts, institutional investors based their bond purchase decisions on credit ratings or equity analysts' reports. Consequently, while bank loans were mostly secured by collateral and covenants, corporate bond issues were mostly not secured and subordinate to banks' claims, without any covenants.

It appears that institutional investors had major difficulties with screening potential bond issuers. Firms whose credit risk was underestimated by institutional investors could exploit this overpricing of bonds to replace bank debt with public debt. Moreover, the miscalculations of the institutional investors exacerbated the moral hazard inherent in the corporate bond market. Cheap, unsecured debt financing and lack of covenants encouraged these firms to increase leverage and to impose a larger haircut on debt-holders in the event of default.

Given these special features of the Israeli corporate bond market, we question whether the behavior of the Israeli bond market was consistent with the aforementioned theoretical and empirical studies. In particular, we study whether the corporate bond market indeed catered to the highest quality firms. For this purpose, we empirically examine the determinants of debt composition for over 500 non-financial firms traded on the Tel-Aviv Stock Exchange (TASE) from 1999 to 2009. We use manually-collected credit rating data from the datasets of local rating agencies and the TASE website, as well as accounting and market data from the Super-Analyst dataset. Data on the share of financial institutions in corporate bond offerings is also manually collected from over 1000 reports on such offerings. We use Probit, OLS and Heckman regressions to examine the determinants of the choice to issue corporate bonds and the share of public debt in the total debt. We show that, in accordance with previous studies, higher quality firms (larger firms and those with higher market-to-book ratio) with credit ratings are more likely to issue bonds. Yet in 2007, unlike previous empirical studies, lower quality firms that do raise public debt tend to exhaust this market, and public debt constitutes a relatively larger fraction of their total debt. We also show that firms with higher fraction of bonds in their long-term debt had a higher tendency to

default in 2005-2009. Observing institutional investors share in corporate bond offerings in 2005-2009, we show that institutional investors did indeed intensively fund firms with a higher share of bonds in long-term debt despite their lower quality.

The paper is organized in the following way. Section 2 briefly describes the Israeli corporate bond market. Section 3 explains how the sample data is constructed, and Section 4 describes the methodology. Section 5 presents the results and Section 6 concludes.

2. The Israeli corporate bond market

The corporate bond market in Israel is relatively new. Until approximately thirty years ago, the financial market in Israel was based on government debt and an undeveloped stock market. The government financed its large deficits by issuing government bonds that were also used as the main investment securities for pension savings (by pension funds, mutual funds, and insurance companies). During the 1980s and 1990s, as the government deficit dropped dramatically, the government gradually reduced the amount of new government bond issues. In addition, during 2001-2002 the investment regulations for institutional investors changed. The new regulations lifted most of the investment restrictions regarding specific investment categories, and added new restrictions that set maximum investments in a specific firm or security. The above changes led to rapid developments in the financial market, initially in the stock market and later (after 2003) to the development of a corporate bond market. During these years, the Israeli economy had a high growth rate, which caused a constant increase in the amount of money managed by institutional investors. An ever-growing portion of the money was invested in corporate bonds, as an alternative to government bond and firm stocks. Finally, new laws, passed in 2005 on the basis of the Bachar Reform, reduced the dominance of the banks in the financial market by forcing them to sell the mutual and provident funds they owned.[2] These funds were sold to non-bank financial institutions, and the centralization of the Israeli financial market was reduced, as firms had alternatives other than bank loans. Following the above changes, the value of the

[2] The Hebrew version of the law can be found at:
http://www.knesset.gov.il/Laws/Data/law/2024/2024.pdf

new corporate bond market grew quickly, from USD 6 billion in 2003 to USD 73 billion in 2009.

Many corporate bonds are rated by at least one of the two local rating agencies (S&P-Maalot and Midroog). These ratings are subject to rating shopping and rating catering because bond issuers can choose by which one of the two to be rated. Bakalyar and Galil (2014) found that during 2004-2012 while one agency (Midroog) systematically assigned higher ratings, the ratings of the other agency (S&P-Maalot) were inflated due to rating shopping. Yet, despite the many features that encourage rating inflation, the resulting distortion was relatively small (one notch). Afik, Feinstein and Galil (2014) examining rating announcements in 2000-2009 found that except for downgrades in 2008–2009, rating announcements by the local agencies had no information value. It seems that generally the market internalized most of the information prior to the rating announcements.

Following the financial crisis of 2008 and the difficulties experienced by many public firms that issued bonds, the Ministry of Finance decided to establish a committee (known as the Hodak Committee) to review the current situation and decide on standard parameters for institutional investors that invest in corporate bonds. In its final report, the committee mentioned that institutional investors hold most of the unregistered and registered commercial bonds on the TASE, making those investors the most dominant factor in that market.[3] Nevertheless, the large number of institutional investors and the inflexible supply of investment capital make it hard for them to translate their dominance into a forceful negotiating position. In this situation, the firms that issue public debt become dominant and dictate the conditions of the debt issued.

3. Data

The data are mostly obtained from the Super-Analyst database, which contains financial report data for Israeli public firms traded on the TASE. This database also separates debt into bonds and other debts. The data on government bonds is obtained from the Bank of Israel website, and the data regarding corporate rating is obtained manually from reports by the two local credit rating providers in Israel, S&P-Maalot

[3] The full report is available (in Hebrew) at http://mof.gov.il/Insurance%20_savings/Pages/HodakCommitteeReport.aspx.

and Midroog, and from the website of the TASE. We also manually pick data on over 1000 corporate bond offerings and the share of institutional investors in each fund-raising. The source of this data is reports by the TASE. The sample of public firms is an unbalanced panel sample. It includes annual financial data from 1999 through 2009 for more than 500 firms each year. We mainly focus on 2004-2009 because the Israeli corporate bond market was very limited prior to this period. Indications on default events are also collected manually from various sources such as TASE, rating agencies and the Israeli Securities Authority (equivalent to the SEC). The establishment date for companies is obtained from the Israeli Corporation Authority. In line with earlier studies (Flannery and Rangan, 2006; Frank and Goyal, 2009), firms in the financial sector are excluded because their financial structure is influenced by different factors than those influencing non-financial firms.

4. Methodology

To examine a firm's debt composition, we first define a dummy variable to represent the holding of corporate bonds (*Bond Dummy* $_{i,t}$). This dummy equals one when firm i has outstanding corporate bonds in year t. In addition, the following equation for debt composition is defined:

$$Bonds\ to\ LTD_{i,t} \equiv \frac{B_{i,t}}{LTD_{i,t}}$$

where $B_{i,t}$ is the book value of firm i's long-term bonds at year t, and $LTD_{i,t}$ is the book value of firm i's long-term debt at year t.[4] We explore the determinants of the decision to issue corporate bonds ($Bond\ Dummy_{i,t}$) and the percentage of bonds out of total debt ($Bonds\ to\ LTD_{i,t}$). When examining bonds out of total debt, we also control for the possible selection bias in the sample of firms with outstanding corporate bonds, using a two-step regression (Heckman, 1979) model. The following model is defined for the first stage of the method:

(1) $$Bond\ Dummy_{i,t} = \propto + \beta' \cdot F_{i,t-1} + \varepsilon_{i,t}$$

where $Bond\ Dummy_{i,t}$ is a dummy variable that equals one when firm i has outstanding bonds at time t. $F_{i,t-1}$ denotes the set of firm-level explanatory variables

[4] This definition does not include current maturities of long-term loans and long-term bonds.

for firm *i* at year $t-1$. All explanatory variables are lagged by one year to be included in the information set, thus limiting endogeneity problems. α, β and γ are the parameters being estimated. The firm-level variables $F_{i,t-1}$ are in accordance with previous literature (e.g., Rajan and Zingales, 1995; Hovakimian, 2003; Hovakimian, Opler and Titman, 2001; Fama and French, 2002; Frank and Goyal, 2009) and include the following variables:

MVA to Assets is the market value of assets divided by the book value of assets. In this definition, the market value of assets is a firm's market value of equity plus its debt book value. The book value of assets is defined as a firm's book value of equity plus its book value of debt.

LN Assets is the log of total (book) assets.

EBIT to Assets is earnings before interest and tax, divided by total (book) assets.

Dummy: rated equals one when a firm has a debt rating. As noted by Bakalyar and Galil (2014), firms have the right not to accept a provided rating if it seems too low. Firms that decide to accept the rating usually have received a high rating and proceed to issue public debt.

Median industry leverage is calculated where leverage is as: [5]

$$L_{i,t} \equiv \frac{D_{i,t}}{D_{i,t}+S_{i,t}\cdot P_{i,t}}$$

where $D_{i,t}$ is the book value of firm *i*'s debt in year *t*. The market value of the equity of firm *i* in year *t* is defined by $S_{i,t} \cdot P_{i,t}$, where $S_{i,t}$ is the number of common shares outstanding in year *t*, and $P_{i,t}$ is the price per share in year *t*. Frank and Goyal (2009) found that median industry leverage is the most important influence on leverage, and that it sums a number of smaller effects, such as stock price volatility and industry regulation.

[5] Industries are defined according to the TASE definitions, and include the following categories: Holdings & Investments, Biomed, Other Industrial, Oil Exploration, Electronics & Electricity, Textile & Clothing, Chemistry & Plastics, Metal, Food & Tobacco, Computers, Hotels & Services, Commerce, Real Estate.

Age is the time (in years) since the firm was established. This variable proxies for credit record. Creditors value firms with a longer credit record more highly because of their lower exposure to asymmetric information. Such debtors also suffer less from moral hazard because of their incentive to maintain their good reputation. Gorton (1996) showed the effect on reputation that issuing notes for the first time has on the early bank note market.

In the second stage of the Heckman estimation, we estimate the following conditioned equation:

$$(2) \qquad E\left(Bond\ to\ LTD_{i,t} \,\middle|\, Bond\ Dummy_{i,t} = 1\right) = \propto + \beta' \cdot G_{i,t-1} + E(\varepsilon_{i,t} \,|\, Bond\ Dummy_{i,t} = 1)$$

where, $G_{i,t}$ is a set of firm-specific variables similar to those of the first stage ($F_{i,t}$), except for *Rating-Dummy*, *Median industry leverage* and *Age*. We also use credit rating dummies based on S&P-Maalot ratings (if there is one) or Midroog ratings (if there is no S&P-Maalot rating). Clustering is used in both stages in order to correct standard errors for possible serial correlation.

We estimate equations (1) and (2) for two time periods, 2004 and 2007. The first represents the period before the expansion of the corporate market, and the second, the peak of the market. To ensure robustness, we also estimate equations (1) and (2) as independent equations. Equation (1) is estimated using a standard Probit approach and equation (2) using an OLS regression.

To further support our results we also examine the effect of bond reliance on firms' tendency to default. For this purpose, we conduct random-effect Probit regressions where the dependent variable $Default_{it}$ indicates a default in the subsequent year. Therefore $Default_{it} = 1$ in case of default and $Default_{it} = 0$ otherwise. The explanatory variables are dummy variable indicating any outstanding bond issued by the firm (*Bond Dummy*$_{i,t}$) and the amount of bonds out of total debt ($Bonds\ to\ LTD_{i,t}$). Control variables are *LN Assets*, *EBIT to Assets* and *Leverage* that have been found in the literature as solid determinants of the probability of default.[6]

[6] See for example Altman (1968), Altman, Haldeman and Naranayanan (1977), Ohlson (1980), Shumway (2001) and Zmijewski (1984).

Lastly, we examine whether institutional investors were indeed responsible for the lax screening of the corporate bond market. Hence, we examine the share of institutional investors in corporate bond offerings of firms with high rate of bond to long-term debt. For this purpose, we manually collect the results of all corporate bond offerings (more than 1000 initial and seasoned offerings) in the years 2005-2009. For each firm, we calculate SII_{it}, the share of institutional investors in the entire bond-raisings by the firm in that year. Bond issues to related companies (parent, subsidiary or sister) are excluded from both the denominator and numerator. Obviously SII_{it} depends on firm's characteristics. We are interested in the correlation between $Bonds\ to\ LTD_{i,t}$ and SII_{it} conditional on these characteristics. Therefore, we estimate the following regression controlling for random effect:

$$Bonds\ to\ LTD_{i,t-1} = \propto + \beta' \cdot DSII_{i,t} + \gamma' \cdot DRating_{it-1} + \varepsilon_{i,t}$$

where $DSII_{i,t-1}$is a vector of dummy variables categorizing the level of SII_{it} and $DRating_{it}$ is a vector of dummy variables categorizing the level of rating. Both $Bonds\ to\ LTD_{i,t}$ and $DRating_{i,t}$ are lagged one year to be included in the information set, thus limiting endogeneity problems.

5. Results

5.1 Descriptive Statistics

Table 1 compares the debt structure determinants by firms with and without bonds for 1999-2009. The comparison in Table 1 indicates that firms with public debt have higher financial leverage, higher earnings (EBIT), and greater book value of assets. In addition, a higher percentage of firms with corporate bonds have credit ratings and are in the real estate industry. Most rated firms have a medium rating of A or lower; a few have a very good AA rating or better. Interestingly, however, most (62.3%) of the firms with outstanding bonds are not rated at all. This is already indicative of a distinctive feature in the Israeli corporate bond market and may indicate the lax screening by institutional investors.

Figure 1 shows the evolution of the number of firms with outstanding bonds over the years 1999-2009. The rapid growth of the market starting 2005 is clearly evident. The number of firms with outstanding bonds almost doubled from 102 in 2001 to 203 in 2005. The financial crisis in 2008 halted the growth. Figure 2 exhibits the bond to long-term debt ratio (*Bonds to LTD*) over the same years for firms with

outstanding corporate bonds only. It shows the increase in corporate bond issues, starting in 2004 and peaking in 2007, when the *Bonds to LTD* ratio reached an average of 0.743. It also shows the drop in this ratio in 2008, following the financial crisis. Our focus is on the years 2004-2007, for which we conjecture that low-quality firms used market's over-pricing or lax screening to raise funds through the corporate bond market.

5.2 Have firms replaced private loans with corporate bonds?

The rise in the *Bonds to LTD* ratio may be due to a rise in corporate bond issuance, a fall in private debt or both. It is interesting to ask whether firms used the evolution of corporate bond market to raise new debt or to replace private debt with public debt or both. It may be that bond issuers only exploited the lax screening in the bond market for raising leverage. However, if private debt is replaced by public debt, it may be a result of commercial banks' willingness to transfer troubled debtors into the hands of the unexperienced institutional investors. Hence, this examination also reveals whether the potentially lax screening may have had positive outcomes for commercial banks.

To investigate this question, we analyze data on cash flow and long-term debt. The pairwise correlation between net cash flow from corporate bond issuance and net cash flow from long-term debt issuance is positive and equal to 0.38 (statistically significant at the 1% level).[7] This result indicates that firms that increased long-term debt tended to increase outstanding corporate bonds and vice versa. This finding confirms the hypothesis that the rise in *Bonds to LTD* was at least partially due to the issuance of new corporate bonds, in addition to outstanding long-term debt.

To examine if the new bonds replaced other bonds, we run a random-effect regression explaining net cash flow from bonds (NCFB):

$$NCFB_{it} = \beta_0 + \beta_1 \cdot NNCFL_{it} + \beta_2 \cdot PNCFL_{it} + \varepsilon_{it} .$$

The explanatory variables are two interaction variables. Negative net cash flow from loans (NNCFL) equals net cash flow from loans when they are negative and is zero otherwise. Positive net cash flow from loans (PNCFL) equals net cash flow from loans when it is positive and is zero otherwise. To avoid extreme outliers we exclude observations with net cash flows from bonds greater than NIS 500m. The model is

[7] This correlation changes over the years, ranging from 0.17 in 2005 to 0.58 in 2007.

evaluated once for the period 1999-2004 and once for 2005-2009. The results are presented in Table 2.

First, we observe that the coefficient of NNCFL is negative and statistically significant in both periods, indicating that firms that increased their outstanding corporate bonds tended to reduce private debt, and vice versa. The coefficient of PNCFL is statistically insignificant in both periods. These two results indicate that private loans and corporate bonds were mostly substitutes rather than complementary. Firms tended to issue new bonds to replace private bonds rather than to supplement them.

However, the regression constant in both periods is positive and statistically significant, indicating a tendency to issue bonds regardless the net cash flow from loans. The greater constant in 2005-2009 relative to 1999-2004 reveals the higher tendency of firms to issue bonds in these years.

We can conclude that the rise in *Bonds to LTD* in 2005-2009 was due both to an increase in long-term debt through the issuance of corporate bonds and to the replacement of private debt with corporate bonds. Overall, we do not find complementary effects between public debt and private debt but only a substitution effect. With this respects our results differ for example from Lin and Chou (2015) that found both complementary and substitute between bank loans and trade credit in China during the global financial crisis (2008-2009).

5.3 Have low-quality firms issued more bonds than high-quality firms?

Now we examine the determinants of *Bonds to LTD***.** Table 3 compares the characteristics of firms with high *Bonds to LTD* ratios to those with low *Bonds to LTD* ratios. For this comparison, we use only firm-year observations with outstanding bonds. We split the sample into two equal sub-groups based on the *Bonds to LTD* ratio. The table shows that compared to firms with low *Bonds to LTD* ratios, firms with high *Bonds to LTD* ratios have on average less leverage and lower earnings (EBIT to Assets), and are smaller in size (book value of assets). In addition, a lower proportion of these firms are rated. This finding is inconsistent with the results for the US market found by Johnson (1997), where higher quality firms also tended to rely more heavily on public debt.

We extend our analysis to control for the selection bias that may exist among the firms with outstanding bonds. For this reason, we estimate the models presented in

equations (1) and (2) to examine the determinants of debt composition. The results of the Heckman's Maximum Likelihood regression model, the Probit model and the OLS regression for these equations are shown in Tables 4 and Table 5. We choose to estimate these equations in two time periods: in 2004, prior to the rapid expansion of the market (Table 4) and in 2007, in the peak of the market (Table 5).

The Wald test of independent equations in the Heckman model reveals that the equations (1) and (2) are independent in 2004 (Table 4) and dependent in 2007 (Table 5). Therefore, we base our conclusions regarding 2004 on the Probit and OLS regressions in Table 4, and our conclusions regarding 2007 on the Heckman model in Table 5.

Regarding 2004, we discover that the larger firms with greater profitability (defined as EBIT to Assets) with ratings had a higher tendency to issue bonds. Yet, the larger firms with greater Market-to-book, (*MVA to Assets)* had lower *Bond to LTD*. The effect of rating on *Bond to LTD* was monotonic, the higher the rating, the higher the *Bond to LTD*. Firms rated AA or higher tended to have significantly larger portion of their debt in bonds.

The results regarding 2007 are somewhat different. We discover that larger firms, firms from industries with higher leverage, greater *MVA to Assets*, with ratings had a higher tendency to issue bonds. Surprisingly, younger firms (lower Age) had also a higher tendency to have outstanding bonds. This finding already points to a shift in the market's behavior during this period.

As for *Bond to LTD*, we discover that smaller firms with lower *MVA to Assets* relied more on bonds than other types of debt. More interestingly, firms with rating of BBB or higher had a larger portion of bond liabilities on their accounts than firms rated A and in a similar scale as firms rated AA or higher. This finding is especially striking when compared with the findings for 2004.

Assuming that higher quality firms are indeed larger firms with higher market-to-book ratio and higher ratings, the findings in Table 5 could be interpreted as follows: higher quality (lower quality) firms had greater (lesser) chances of having public debt. However, high-quality (low-quality) firms that did issue public debt had a lower (higher) percentage of public debt out of their total long-term debt. These findings suggest that once low-quality firms entered the bond market, they preferred bond liabilities over bank loans. This may reflect a view that bond liabilities embed a haircut

option by the issuer that is not available for bank loans. Bank's expertise and monitoring skills pushed low-quality firms to prefer bonds over bank loans.

The coefficient of *Dummy: rated* is positive and statistically significant in the first step of the Heckman model. It appears that being rated correlates positively with outstanding corporate bonds. This finding is in line with theoretical predictions including those of Diamond (1989), Diamond (1991), Berlin and Loyes (1988), Berlin & Mester (1992), Chemmanur and Fulghieri (1994) and Cantillo and Wright (2000). This finding is also consistent with the empirical examination of Faulkender and Petersen (2006), using US data.

The results of the second step are compatible with Diamond's (1991) model that predicted firms with a credit rating toward the middle of the spectrum rely on bank loans. However, the results of the first step reveal a different relationship, in which the higher quality firms were the ones who issued corporate bonds.

5.4 Did high-risk firms issue more bonds?

To examine the robustness of our results we estimate the effect of reliance on bonds on the probability of default. For this purpose, we run random-effect Probit regressions for the probability of default. The sample used for this step consists of all observations for the years 2004-2008. We collect data on cases of default from various sources (corporate reports to the TASE and Israeli SEC, and reports by the local rating agencies). To avoid selection bias, we include not only defaults on bonds but also any default on loans and supply credit in our definition of default events. We also include cases of reorganization and liquidation following a law suit. The final sample consists of 2530 annual observations for 597 firms and 35 default events in 2005-2009 of which 27 could be classified as default on bond payments before any other type of default.

The results of the regressions are presented in Table 6. Model I includes the three main accounting variables that have been found as firm explanatory predictors of default: *Size* (Ln of Assets), *Leverage and profitability* (EBIT to Assets). The estimated coefficients of Model I are all statistically significant with the expected sign. Model II adds the *Bond dummy* as an explanatory variable. Though the coefficient is positive, it is statistically insignificant. Model III replaces the *Bond dummy* with *Bond to LTD*. The sign is positive and statistically significant. This finding, consistent with the results of the previous analyses concludes that firms with higher default risk had a higher portion of their debt in the form of bonds.

5.5 Were institutional investors responsible for the lax screening?

Lastly, we wish to examine whether the tendency of low-quality firms to rely on bonds was indeed due to lax screening by institutional investors. To investigate this question we use the share of institutional investor (SII) in the funds raised by corporate bond issuers. We manually collected data on corporate bond new offerings during the years 2004-2009, and were able to identify the funds directly raised from the institutional investors. SII is the share of funds raised from institutional investors through bonds in a calendar year out of the total amount raised from issuance of bonds to unrelated firms (i.e. excluding parent, sister and subsidiary companies).

Figure 3 shows the distribution of SII in the sample. There are 3 mass points: 0 (14 observations), 0.8 (72 observations) and 1 (102) observations. The rest of observations are of SII greater than zero but smaller than 0.8 (167 observations) or greater than 0.8 but smaller than 1 (61 observations). Therefore, we create 5 categorical variables, each for a different point/range:

Dummy – SII=0 equals one where SII=0 and zero otherwise;

Dummy – 0<SII<0.8 equals one where 0<SII<0.8 and zero otherwise;

Dummy – SII=0.8 equals one where SII=0.8 and zero otherwise;

Dummy – 0.8<SII<1 equals one where 0.8<SII<1 and zero otherwise;

Dummy – SII=1.0 equals one where SII=1.0 and zero otherwise.

Table 7 displays the mean and median *Bond to LTD* and ratings in the various ranges of SII. Both *Bond to LTD* and ratings are lagged one year. For example, the average *Bond to LTD* in the previous year to bond issuances with institutional investors share of *SII=0.8* was 0.256 and a share of 0.069 of these bonds had a rating of A.

Interestingly, Table 7 shows that financial institutions do not avoid bond offerings of non-rated firms. However, the majority of cases where SII>0.8 are bonds rated A or higher while the majority of the cases where $0 < SII \leq 0.8$ are of non-rated bonds. The behavior of *Bond to LTD* with respect to SII is non-monotonic. SII=0.8 appears to be the default for the lowest *Bond to LTD*. However, as also reflected in Figure 4, the higher the *Bond to LTD*, institutional investors tend either to reduce their share or to increase it. Reducing SII where *Bond to LTD* may be attributed to the higher default risk characterizing these firms as shown in the previous analyses. However, the rise of SII with *Bond to LTD* is evidence of lax screening. Instead of reducing their

share in bonds of firms with high *Bond to LTD* institutional investors in fact increased their demand, enabling these firms to increase their reliance on bonds even more.

Lastly, we examine the statistical significance of these findings. Since we divide SII into five categorical variables, we choose *Bond to LTD* as the dependent variable rather than an explanatory variable. We also control for the level of credit risk by using rating dummy variables. If institutional investors are responsible for the higher *Bond to LTD* of firms, we should expect increasing monotonic coefficients of the SII dummies. That means that we should expect to have higher *Bond to LTD* when the share of institutional investors in bond issuances increases. Conservative, responsible behavior of institutional investors should be reflected in decreasing coefficients. (Remember that the dependent variable *Bond to LTD* is lagged one year.) Therefore, the estimated coefficients reflect the response, in terms of their share in bond purchases to the *Bond to LTD* they observe at the time of the offering.

Table 8 reports the results of the random-effect regressions. SII=0.8 and non-rated firms are the benchmark (omitted dummy variables) in this regression. We observe the U-shape in *Bond to LTD* both regarding ratings and SII. As in Table 5, firms rated AA or higher and firms rated BBB or lower have a higher *Bond to LTD* than firms rated A. The differences are also statistically significant. The new, interesting finding is that the lower the SII than 0.8 or the higher the SII than 0.8, the higher is *Bond to LTD*. The interpretation of these findings is that institutional investors facing firms with higher *Bond to LTD* either reduced their share as a response to the lower firm quality or increased their share. The latter finding which is also statistically significant after controlling for ratings is a smoking gun for lax screening on the corporate bond market.

6. Summary & Conclusions

The findings of this paper suggest that higher quality (lower quality) firms have greater (lesser) chances of issuing bonds, indicating accessibility to the public debt market. In addition, among the firms that were able to issue bonds, higher quality (lower quality) firms had a lower (higher) percentage of public debt out of the firm's overall long-term debt. From the perspective of lower quality firms, these findings may indicate that lower quality firms have fewer chances to issue bonds, but if they manage to do so, they take advantage of this opportunity to issue a large percent of public debt out of their total debt.

These results are consistent with allegations that, during the sample period, Israeli institutional investors lacked experience in credit analysis and therefore the firms were subject to lax screening. As a result, some low-quality firms managed to issue bonds, and then replaced a large portion of their private debt with public debt, providing almost no collateral and no covenants. This situation exacerbated the agency problem inherent in credit markets, and firms used this situation not only to replace private debt with public debt but also to raise leverage, thus forcing a higher "haircut" (lower recovery rate) in case of default.

The results of this paper differ from those in studies conducted with US data. It would be valuable to conduct similar research on other emerging markets to evaluate whether the current empirical research is consistent with the situation in other young and growing credit markets.

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Tables

Table 1: Descriptive statistics for debt structure determinants-comparing firms with and without bonds

This table compares the descriptive statistics of firms with outstanding bonds to those of firms without outstanding bonds in an unbalanced panel dataset for the period 1999-2009.

	Firms with outstanding bonds		Firms without outstanding bonds	
	Mean	SD.	Mean	SD.
Leverage	0.674	0.199	0.554	0.236
Median industry leverage	0.605	0.151	0.564	0.150
EBIT To Assets	0.270	0.432	0.191	0.466
MVA To Assets	1.163	0.522	1.336	1.465
LN Assets	13.517	1.636	12.183	1.415
Bonds to LTD Ratio	0.597	0.317	0.000	0.000
Dummy: real-estate	0.329	0.470	0.183	0.386
Dummy: rated	0.377	0.485	0.038	0.192
Dummy: AA or higher	0.120	0.325	0.025	0.156
Dummy: A	0.213	0.410	0.012	0.108
Dummy: BBB or lower	0.044	0.204	0.002	0.042
Dummy: No Rating	0.623	0.485	0.962	0.192
Age	29.128	18.128	28.910	17.727
Observations	1694		1693	

Table 2: Net cash flow from bonds vs. net cash flow from loans

This table shows the results of random-effect regressions where the dependent variable is the net cash flow from bonds (NCFB) and the independent variables are two interaction variables. Negative net cash flow from loans (NNCFL) equals net cash flow from loans when they are negative and is zero otherwise. Positive net cash flow from loans (PNCFL) equals net cash flow from loans when it is positive and is zero otherwise. The sample excludes observations with net cash flows greater than NIS 500m.

$$NCFB_{it} = \beta_0 + \beta_1 \cdot NNCFL_{it} + \beta_2 \cdot PNCFL_{it} + \varepsilon_{it}$$

Dependent variable: Net cash flow from bonds (NCFB)	1999-2004		2005-2009	
Independent variables	Coefficient	P-value	Coefficient	P-value
Negative net cash flow from loans (NNCFL)	-0.236	0.000	-0.235	0.000
Positive net cash flow from loans (PNCFL)	-0.413	0.790	1.520	0.673
Constant	3132	0.000	11934	0.000
Observations	1653		1907	
Firms	497		598	
Prob > chi2	0.000		0.000	
Adjusted R-squared	0.080		0.029	

Table 3: Descriptive statistics for debt structure determinants: Comparing firms with high and low bond-to-long-term debt ratio

This table compares the descriptive statistics for firms with high bonds-to-long-term debt (LTD) ratio to those with low *Bonds to LTD* ratio. For this purpose, the entire sample of firm-year observation during the period 1999-2009 is divided into two equal groups, based on their bond to LTD ratios.

	High Bonds to LTD Ratio		Low Bonds to LTD Ratio	
	Mean	SD.	Mean	SD.
Leverage	0.617	0.208	0.731	0.171
Median industry leverage	0.575	0.164	0.634	0.130
EBIT To Assets	0.216	0.459	0.323	0.396
MVA To Assets	1.251	0.666	1.074	0.293
LN Assets	12.994	1.636	14.039	1.461
Bonds to LTD Ratio	0.876	0.125	0.318	0.172
Dummy: real-estate	0.250	0.433	0.409	0.492
Dummy: rated	0.348	0.477	0.405	0.491
Dummy: AA or higher	0.111	0.314	0.129	0.335
Dummy: A	0.185	0.389	0.241	0.428
Dummy: BBB or lower	0.052	0.222	0.035	0.185
Dummy: No Rating	0.652	0.477	0.595	0.491
Age	27.661	17.834	30.595	18.311
Observations	847		847	

Table 4: Determinants of bond issuance: 2004

This table shows the regression results for the determinant of bond issuance. The Heckman's maximum likelihood regression is for a sample of 276 firms in 2004. The dependent variable in the first step is a dummy variable (*Bond dummy*) that equals one if the firm has outstanding debt and zero otherwise. In the second step the dependent variable (*Bonds to LTD*) is bonds out of total long-term debt ratio. Clustering is used to correct standard errors for possible serial correlation. The Probit model is for the determinants of the *Bond dummy* and the regression is for *Bonds to LTD*. All independent variables are lagged by one year.

	Heckman		Probit		OLS Regression	
Step 1: dependent variable: *Bond dummy*	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
LN Assets	0.324	0.000	0.396	0.000	-	-
Median industry leverage	-0.151	0.863	-0.146	0.830	-	-
EBIT To Assets	-0.023	0.910	0.523	0.019	-	-
MVA To Assets	0.051	0.000	0.045	0.133	-	-
Dummy: rated	1.539	0.000	1.443	0.000	-	-
Age	-0.059	0.713	-0.101	0.493	-	-
Observations	276		276		-	
Step 2: dependent variable: *Bonds to LTD*	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
LN Assets	-0.075	0.002	-	-	-0.086	0.000
EBIT To Assets	-0.036	0.645	-	-	-0.022	0.744
MVA To Assets	-0.010	0.003	-	-	-0.011	0.002
Dummy: AA or higher	0.336	0.002	-	-	0.311	0.001
Dummy: A	0.041	0.683	-	-	0.002	0.978
Dummy: BBB or lower	-0.027	0.865	-	-	-0.063	0.741
Observations	109		-		109	
Prob > chi2	0.000		0.000		0.001	
Wald test of independent equations Prob>chi2	0.613		-		-	

Table 5: Determinants of bond issuance: 2007

This table shows the regression results for the determinant of bond issuance. The Heckman's maximum likelihood regression is for a sample of 357 firms in 2007. The dependent variable in the first step is a dummy variable (*Bond dummy*) that equals one if the firm has outstanding debt and zero otherwise. In the second step, the dependent variable (*Bonds to LTD*) is bonds out of total long-term debt ratio. Clustering is used to correct standard errors for possible serial correlation. The Probit model is for the determinants of the *Bond dummy* and the regression is for the *Bonds to LTD*. All independent variables are lagged by one year.

	Heckman		Probit		OLS Regression	
Step 1: dependent variable: *Bond dummy*	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
LN Assets	0.071	0.017	0.103	0.056	-	-
Median industry leverage	1.759	0.002	1.441	0.007	-	-
EBIT To Assets	-0.087	0.618	-0.253	0.156	-	-
MVA To Assets	0.003	0.011	0.002	0.592	-	-
Dummy: rated	0.730	0.000	0.709	0.002	-	-
Age	-0.387	0.000	-0.395	0.000	-	-
Observations		357		357		-
Step 2: dependent variable: *Bonds to LTD*	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
LN Assets	-0.065	0.000	-	-	-0.068	0.000
EBIT To Assets	-0.008	0.844	-	-	-0.004	0.932
MVA To Assets	-0.001	0.005	-	-	-0.001	0.112
Dummy: AA or higher	0.208	0.001	-	-	0.180	0.009
Dummy: A	0.021	0.636	-	-	-0.010	0.834
Dummy: BBB or lower	0.216	0.013	-	-	0.182	0.323
Observations	232		-		232	
Prob > chi2	0.000		0.000		0.000	
Wald test of independent equations Prob>chi2	0.005		-		-	

Table 6: Bond issuance and the probability of default.

This table shows the results for random-effect Probit regressions for default events. The sample includes annual observation in the period 2004-2008 of which 35 cases of default in the subsequent year. *Bond dummy* equals one if the firm has outstanding debt and zero otherwise. *Bonds to LTD* is bonds out of total long-term debt ratio.

	Model I		Model II		Model III	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
Bond dummy	-	-	0.441	0.154	-	-
Bonds to LTD	-	-	-	-	1.272	0.044
LN Assets	-0.462	0.002	-0.184	0.025	-0.039	0.694
Leverage	5.770	0.000	4.755	0.000	4.246	0.001
EBIT To Assets	-0.931	0.006	-0.644	0.004	-0.629	0.016
Year dummies	Yes		Yes		Yes	
Observations	2530		1708		997	
Firms	597		439		295	
Pr(Xi^2)>0	0.002		0.000		0.000	

Table 7: Bond issuer characteristics and the share of institutional investors

This table shows the characteristics (Bond to LTD and rating) of firms offering bonds by the share of institutional investors in the total fund raised through bonds in each calendar year (SII). The sample includes 416 annual observations on 209 firms in the period 2004-2009. *Bonds to LTD* is the lagged value of bonds out of total long-term debt ratio and ratings are based on S&P-Maalot rating or Midroog ratings (if there is no S&P rating) in the previous year.

Share of Institutional Investors (SII)	Observations	Bond to LTD		Rating				
		Mean	Median	AA or higher	A	BBB or Lower	non-rated	Total
SII=0	14	0.675	0.797	0.000	0.429	0.143	0.429	1.000
0<SII<0.8	167	0.508	0.510	0.162	0.240	0.036	0.563	1.000
SII=0.8	72	0.256	0.000	0.028	0.069	0.014	0.889	1.000
0.8<SII<1	61	0.502	0.534	0.295	0.213	0.016	0.475	1.000
SII=1	102	0.563	0.596	0.373	0.265	0.010	0.353	1.000
Total	416	0.483	0.456	0.204	0.219	0.026	0.550	1.000

Table 8: Share of institutional investors in bond offerings and Bond to LTD

This table shows the result of a random-effect regression where the dependent variable is *Bonds to LTD* (the lagged value of bonds out of total long-term debt ratio) and the independent variables are dummy variables for the share of institutional investors in the bond offering and ratings in the previous year. The sample includes 410 annual observations on 209 firms in the period 2004-2009. *Bonds to LTD* is the lagged value of bonds out of total long-term debt ratio and ratings are based on S&P-Maalot rating in the previous year or Midroog ratings (if there is no S&P rating).

$$Bonds\ to\ LTD_{i,t-1} = \propto + \beta' \cdot DSII_{i,t} + \gamma' \cdot DRating_{it-1} + \varepsilon_{i,t}$$

Dependent variable: Bonds to LTD (lagged)		
Independent variables	Coefficient	P-value
Dummy: SII=0	0.313	0.000
Dummy: 0<SII<0.8	0.165	0.000
Dummy: 0.8<SII<1	0.136	0.017
Dummy: SI=1	0.194	0.000
Dummy: rating AA or higher	0.282	0.000
Dummy: rating A	0.178	0.000
Dummy: rating BBB or lower	0.382	0.000
Constant	0.212	0.000
Observations	416	
Firms	209	
Pr(Xi^2)>0	0.000	
Adjusted R-squared	0.240	

Figures

Figure 1: Evolution of firms with outstanding bonds

This figure shows the evolution of the number of firms with outstanding bonds for 1999-2009.

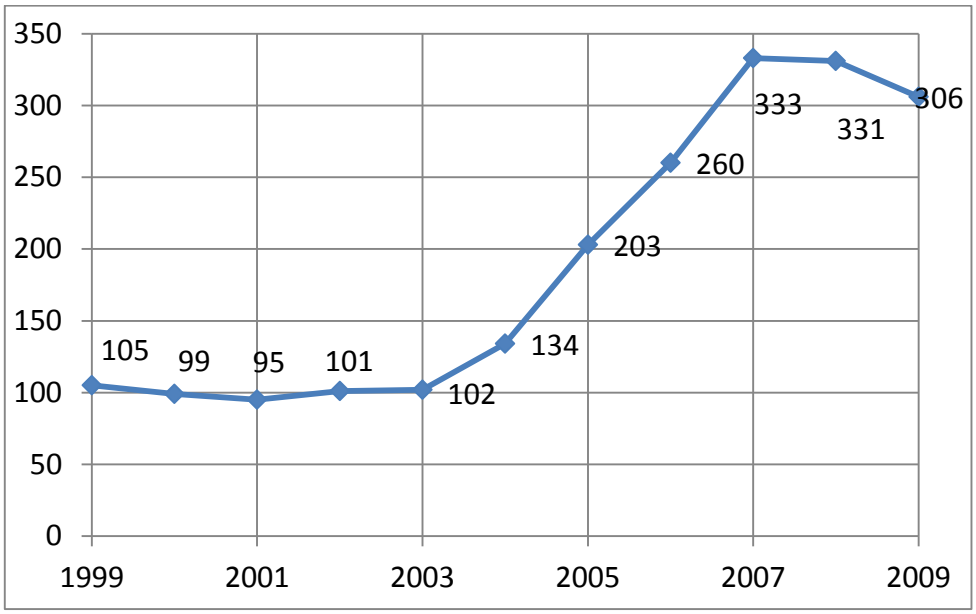

Figure 2: Evolution of outstanding bonds to long term debt (*Bonds to LTD* ratio)

This figure shows the evolution of the mean of the book value of outstanding bonds to long-term debt (Bonds to LTD ratio) for all firms with outstanding bonds for 1999-2009.

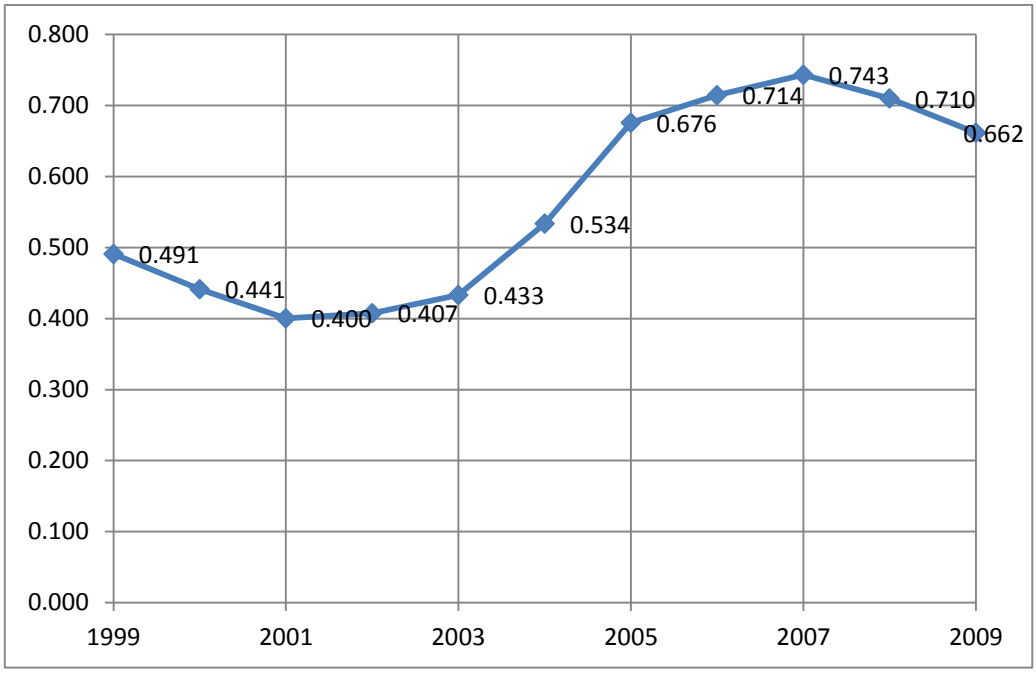

Figure 3: Distribution of institutional investors share in corporate bond offerings

This figure shows the distribution of the share of institutional investors (SII) in corporate bond offerings. The sample includes 416 annual observations on 209 firms for 2004-2009.

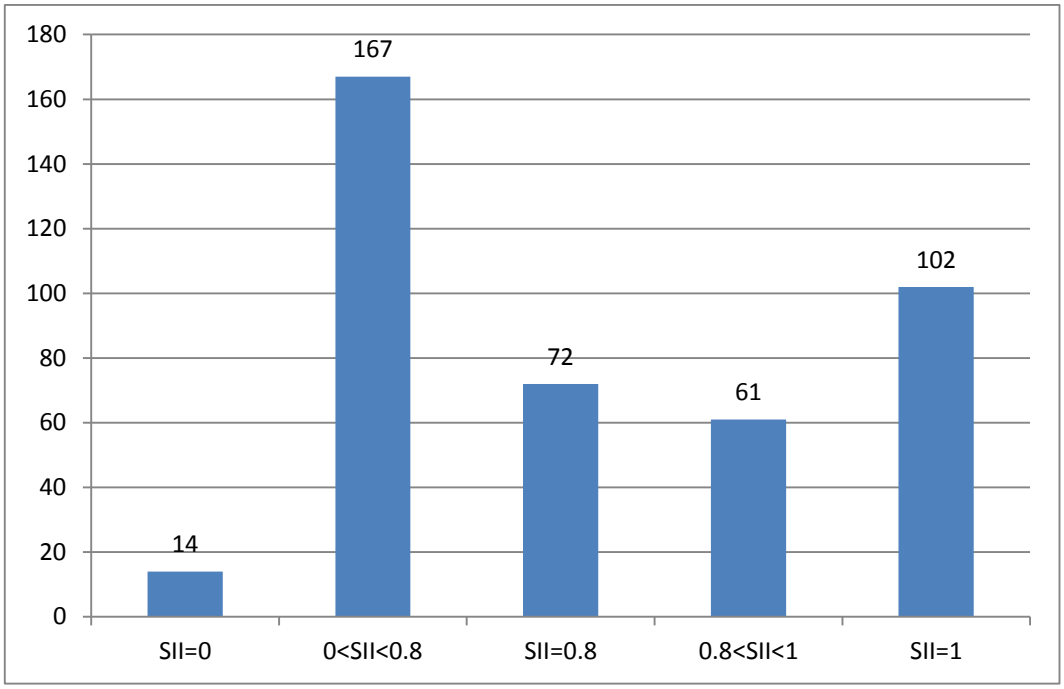

Figure 4: Bonds to LTD prior to bond offering by the share of institutional investors.

This figure shows the mean of the *Bonds to LTD* by share of institutional investors in corporate bond offerings. The sample includes 416 annual observations on 209 firms in the period 2004-2009. *Bonds to LTD* is the lagged value of bonds out of total long-term debt ratio